The tornado originated in Harrison, County, Ind., moved thence east-northeast in a path about 40 miles long and of varying width. The effect of rising ground on the pendant funnel cloud is discussed as follows:

* * * The district traversed rises in a rolling plateau, with the highest part a rather abrupt escarpment on the eastern edge, along the Ohio River, where the elevation averages about 850 feet above sea level. With the increasing elevation the funnel of the tornado became more and more deeply truncated, which caused the path of practically total destruction to widen to about half a mile. At the edge of the plateau along the Ohio River, where the descent is very abrupt, being about 400 feet in as many yards, the funnel dipped down immediately and destroyed all buildings in its path, even at the foot of the bluff over which it had come. At this point the path narrowed to about 900 feet; it narrowed further in crossing the Ohio, but widened again to more than 1,000 feet as higher ground was reached about 2 miles to the eastward, after which it generally contracted until it was only 50 feet wide at Pewee Valley.

* * * At the time of its passage the center of the low-pressure area was near Indianapolis. Immediately after the passage of the tornado at Louisville the skies cleared, the air became calm, and the temperature rose about 8° * * *.

Mr. Kendall notes that this tornado passed through Harrison County near Elizabeth, within less than 2 miles of the path of the severe tornado of May 27, 1890, which, it may be remembered, struck Louisville, causing great loss of life and property.

The Louisville barograph shows frequent oscillations from about 7:30 a. m. to 4 p. m., or just before the passage of the tornado. The lowest point on the Louisville trace was reached at 6 p. m., which corresponds pretty closely with the time of the passage of the cyclone center about 115 miles to the north.

ABILITY OF MODERN STRUCTURES TO WITHSTAND TORNADOES

Much interest is evident in recent years in the ability of well-constructed buildings of brick, stone, concrete, or what not, to withstand the terrific force of the wind as exerted in tornadoes.

Photographs of the destruction in various parts of the tornado path seem to show that light frame structures, which abounded in the towns and villages of southern Illinois, were totally demolished, although in a few cases the framework of the buildings held together even when the building was swept from its foundation.

The damage to school buildings of brick construction was particularly noticeable; the roofs were ripped off and the upper stories badly wrecked.

A correspondent of Engineering News-Record, writing in the issue of March 26, mentions the fact that at Murphysboro, while a clean sweep was made of structures in the northwest part of the city, two reinforced concrete coal bins within 300 feet of the Mobile & Ohio Railroad shops, which latter were destroyed, were left standing undamaged in the midst of a mass of wreckage. Also near the railroad shops two steel wheat bins * * * are still intact, although one of them is leaning. The brick building of the Brown Shoe Co. in Murphysboro was damaged considerably. Immediately in the rear is a 160-foot reinforced-concrete smokestack. In spite of the great amount of destruction around this structure, it remains standing and shows no signs of damage whatever. A small two-story building of plain concrete was practically destroyed, its 8-inch walls being sheared off entirely at the top of the first floor.

Root and Barron, in a supplemental report on damage to buildings, say:

Frame dwellings.—Unless well built, largely totally demolished in main path of tornado. A house in Griffin, Ind., lying on its side was returned to its original position by workmen practically intact. It had diagonal sheathing, which added much strength. Of houses not destroyed, the roofs and porches were taken off and in some cases the second story.

Stucco residences.—An architect in Murphysboro invited our attention to the fact that stucco houses resisted the storm to best advantage, and we found from observation that they did stand up better than frame buildings. There were few stucco houses except in Murphysboro. (We saw none.)

Brick buildings—Schools.—For the most part in two-story brick schools the first floor walls remained practically intact; in the second story the interior walls largely remained standing, though the outer walls crumbled. The Mobile & Ohio shops at Murphysboro, brick buildings, were demolished by wind and afterwards burned. In general, brick store buildings in the direct path of the storm were destroyed. A new brick two-story mine office building at Orient No. 2 mine at West Frankfort was practically undamaged, but it was in the lee of the large steel mine tipple. To the best of our memory, brick buildings stood up where they had steel trussed roofs.

Steel construction.—Steel water and oil tanks belonging to the railroad at Gorham were unharmed. A similar steel water tank at West Frankfort mine was blown over. At the same mine (Orient No. 2) the steel conveyor was badly damaged, but the large modern steel tipple was not greatly harmed. The tipple at Caldwell mine (wood and steel) was demolished.

THE TORNADO OF APRIL 5, 1925, NEAR MIAMI, FLA.

By RICHARD W. GRAY

[Weather Bureau Office, Miami, Fla., April 15, 1925]

The destructive tornado which passed north of Miami during the early afternoon of Sunday, April 5, 1925, occurred in connection with a disturbance that had moved southeastward across the United States from the California coast and that was central over extreme northern Florida at the time of the tornado.

The tornado developed over the Everglades, apparently in the vicinity of Hialeah, which is about 4 miles northwest of the city limits of Miami and about 8 miles northwest of the Weather Bureau station. The funnel cloud was first observed by golf players on the municipal golf course at Hialeah at 1 p. m. or a few minutes earlier. Its development was also seen by many other persons whose attention had been attracted by the unusually threatening sky which attended a thunderstorm and hailstorm preceding the tornado. The opportunities for observing the storm were exceptionally favorable. The usual large Sunday crowd was out of doors, many hundred automobilists being near the tornado path. Moreover, on account of its slow progress, word of the tornado was widely spread and several thousand persons watched it until it disappeared.

Many observers stated that the development of the tornado immediately followed the uniting of two dense cloud masses. When first seen by the writer, at 1:15 p. m., the development was complete, and the funnel cloud appeared as a very slender cone extending in a straight line from the dense cloud mass above to the earth. With the exception of a slight bending and twisting of the lower part of the cone, there was no deviation at any time from the vertical position of the funnel cloud. This was undoubtedly due to the slow movement of the general cloud mass. The funnel cloud, however, frequently rose from the ground only to descend again within a few minutes. When its end touched the ground there invariably followed a phenomenon similar

to that caused by the explosion of a high-powered shell. The air surrounding it for a considerable elevation above the ground was immediately filled with dust and débris which, at a distance, appeared like dense smoke from burning oil.

After the storm had been in progress for about 20 minutes it stopped its progressive movement for five minutes. Until it resumed its northeastward course the writer thought it had turned to the northwestward and was moving directly away in the line of vision. Its location at this time was over a large dairy, where one person was killed and one fatally injured and where 20 others were injured. The loss at the dairy from the destruction of buildings, motor trucks, automobiles, and livestock was estimated at $100,000. The funnel cloud rose and descended twice during the stationary period, causing the less severely injured persons at the dairy to think that a second tornado followed closely behind the first.

After the storm resumed its northeastward course it passed over several suburban communities northwest and north of Miami, wrecking many residences, killing or fatally injuring three persons, and injuring many others. Several persons escaped injury and probable death by deserting their automobiles and fleeing. The automobiles were destroyed, some of them being picked up and carried for a considerable distance through the air.

By the time the storm had reached a position directly north of Miami the funnel cloud had increased greatly in diameter and it was soon afterwards obliterated by heavy rain between Miami and the path of the storm. No serious damage was done after this time, and the tornado formation apparently dissipated over the extreme northern part of Biscayne Bay. In the eastern end of the path prostrated poles lay with their tops toward the southwest, showing the effects of the whirling motion.

The path of the storm averaged less than 100 yards in width, and many buildings and trees immediately outside of it were uninjured. Buildings left standing in the path showed where the cloud rose from the ground.

The tornado was preceded by a heavy fall of hail, which was confined principally to the tornado path. In some localities the ground was completely covered, and hail stones were reported as large as a baseball or a man's fist. Many were measured that were 3 inches in diameter. Hailstones perforated the tops of automobiles and damaged the roofs of some houses.

The instruments at the Weather Bureau station at Miami were not affected by the storm. Light southeast winds prevailed at the station during the forenoon of the 5th and until after the tornado had disappeared. As the tornado was carried along in a southwest current, it is evident that it occurred along the wind-shift line of the general disturbance. The pressure at Miami fell gradually until shortly after 2 p. m., when the wind-shift line passed over the station, attended by a thunderstorm with characteristic rise of pressure and a decided increase in wind force. The maximum velocity recorded was 24 miles per hour, from the west, at 2:20 p. m. This was after the tornado had disappeared. The slow movement of the wind-shift line accounts for the slow progress of the tornado, which required approximately one hour to move the 12 miles from Hialeah to the northern part of Biscayne Bay. There were no fluctuations of pressure at the Weather Bureau station during the progress of the tornado.

The storm caused the death of five persons and the destruction of much property. About 35 persons were injured and received treatment in local hospitals, while others, less severely injured, were treated in private dwellings. The estimated property loss was between $200,000 and $300,000.

OCEAN TEMPERATURES ACROSS THE EQUATOR

By W. J. HUMPHREYS

Everyone is accustomed to the well-known and obviously reasonable fact that the highest average annual temperature over extensive land areas occurs along or near the Equator. He is surprised, therefore, when he learns that, in general, the highest temperature of the ocean at every depth, save near the surface, is at 30°, roughly, north and south of the Equator. As the surface is approached from a depth of around 400 meters these maxima rapidly draw closer together, but do not merge even at the surface.

At every depth from 50 to 1,000 meters, or thereabouts, the equatorial water is approximately 5° C. colder than the warmest water at that level both north and south. As the depths become abysmal this contrast, though still present, is very slight, the temperature everywhere being of the order 1° to 3° C.

Most of these facts are shown graphically in Figure 1, a thermal cross section of the Atlantic Ocean at 30° W.[1]

Evidently this temperature distribution is owing essentially to the gradual sinking of water in the latitudes 15° to 40°, perhaps, north and south, and the slow upwelling of the ocean in the equatorial regions. This circulation in turn, however, seems to be the result of several factors:

1. Around latitudes 20° to 35° the skies are comparatively clear and evaporation in excess of precipitation.

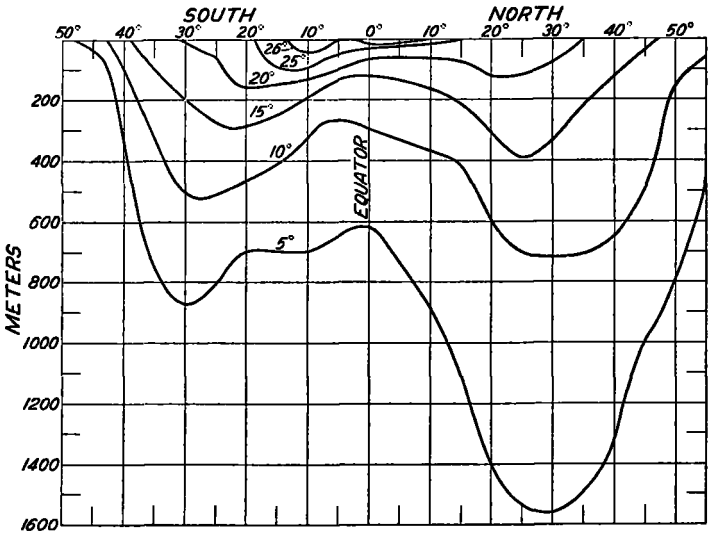

FIG. 1.—Temperature cross section of the Atlantic Ocean at longitude 30° W.

This increases salinity and, thereby, the density, which, of course, leads to sinking.

[1] Adapted from Tafel 28, Deutsche Tiefsee-Expedition, 1898–99, *Wiss. Ergeb.*, Band I, Atlas.